

REMARKS

Claims 18-20 and 22-37 are pending in the application. The status of the claims and issues related to the specification are identified below:

Claims / Section	35 U.S.C. Sec.	References / Notes
30-34	Allowable	<ul style="list-style-type: none"> • Objected to as dependent from a rejected base claim.
18-20 & 22-37	§112, Second Paragraph Indefiniteness	<ul style="list-style-type: none"> • Ambiguous sentence structure.
18, 19 & 28	§103(a) Obviousness	<ul style="list-style-type: none"> • Hochstein (U.S. Patent No. 6,045,240); • Roney et al. (U.S. Patent No. 5,528,474); and • Abtahi, et al. (U.S. Patent No. 5,890,794).
20, 35	§103(a) Obviousness	<ul style="list-style-type: none"> • Hochstein (U.S. Patent No. 6,045,240); • Roney et al. (U.S. Patent No. 5,528,474); • Abtahi, et al. (U.S. Patent No. 5,890,794); and • Zouzoulas, et al. (U.S. Patent No. 5,059,778).
22-26, 29 & 36	§103(a) Obviousness	<ul style="list-style-type: none"> • Hochstein (U.S. Patent No. 6,045,240); • Roney et al. (U.S. Patent No. 5,528,474); • Abtahi, et al. (U.S. Patent No. 5,890,794); and • Pederson (U.S. Patent Publication No. 2003/0021121 A1).
27 & 37	§103(a) Obviousness	<ul style="list-style-type: none"> • Hochstein (U.S. Patent No. 6,045,240); • Roney et al. (U.S. Patent No. 5,528,474); • Abtahi, et al. (U.S. Patent No. 5,890,794); • Pederson (U.S. Patent Publication No. 2003/0021121 A1); and

		<ul style="list-style-type: none">• Deese (U.S. Patent No. 5,806,965)
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Applicants thank the Examiner for indicating the allowability of claims 30-34. Applicants have amended claim 18 to clarify the scope of coverage and to further include the limitations of claim 26. Claims 23-25 and 27 have been amended to depend from the independent claim, and claims 29, 30, and 32 have been amended for the sake of consistency. The improper dependency of claim 32 from claim 20 has been corrected. Applicants have also provided discussion below for distinguishing the present invention, with claims as amended, from the art of record.

35 U.S.C. §112, SECOND PARAGRAPH, INDEFINITENESS OF CLAIM 18

1. Applicants have amended claim 18 to clarify the scope that is claimed.

In a telephone interview with the Examiner conducted in March of 2004, the Examiner raised a question about the coverage of claim 18 and pointed out the possibility of an ambiguous interpretation. Applicants informally presented amended claim 18 language to the Examiner believed to clarify the scope. The Examiner agreed that the language clarified the scope and thus the proposed amendment is now formally submitted for consideration.

Applicants respectfully request that the 35 U.S.C. §112 rejection be withdrawn from the application. In the event that questions remain, the Examiner is invited to contact Applicants' representative for further clarification. Applicants thank the Examiner for her efforts in helping to resolve this issue.

**35 U.S.C. §103 OBVIOUSNESS OF CLAIMS 18, 19 AND 28 OVER HOCHSTEIN IN VIEW
OF RONEY AND ABTAHI**

2. Applicants have amended claim 18 to further include the limitations of claim 26 requiring electrical isolation of the metallic layer from the LEDs.

5 In the OA on p. 3, under numbered paragraph 5, the Examiner cites Hochstein as disclosing every element of claim 18 except the plastic circuit board or a secondary surface applied to a curved surface. Applicants have added the limitation of claim 26 to claim 18 so that it requires the metallic layer on the secondary surface to be isolated from the LEDs.

10 In Hochstein, the thermal conduction from the principal surface (surface with LEDs) to the secondary surface of the circuit board, in accordance with Figure 4, achieved by means of pads 50 defining a thermally conductive plating and extending from the principal surface via holes in the circuit board 26 to the secondary surface. The circuit board is secured on the side of the secondary
15 surface to a heat sink having cooling fins (Figure 3). The electrically conducting pads are electrically insulated from one another by means of spaces 54 to avoid electrical shortening.

 In the invention, however, the thermal conduction from the principal surface to the secondary surface is effected through the circuit board, as
20 described in the originally submitted specification at 5/10 – 6/4. Since the thermal conduction from one side of the circuit board to the other side of the circuit board may be effected through the circuit board material, which comprises a plastic material, plastics usually showing rather poor thermal conductivity, it is advisable to form the circuit board comparatively thin. A separate thermally and

electrically conducting connection from the principal to the secondary surface, as pads 50 in Hochstein, of the circuit board can be dispensed with in the present invention.

The examiner states, on p. 6 of the OA, 4th paragraph, "Regarding claim
5 26, Hochstein discloses a circuit board that electrically insulates the metallic layer from the plurality of LEDs (column 5, lines 2-3)." However, in this discussion section, the only metallic layer described is the one on the same side with the LEDs, "... L.E.D.'s 28 having leads 30 and 32... mounted on the first surface and an electrical or conductive plating on the first surface for establishing discrete
10 and electrically conductive paths". 5/5-8. [Emphasis added] The only portion describing a metallic layer on the second surface involves the previously discussed arrangement in which the second surface metallic layer is electrically connected and conducted to the first surface.

15 With respect to Abtahi, there is no disclosure pertaining to a circuit board applied to a curved surface of a cooling member. Rather, Abtahi describes a circuit board with LEDs mounted on this circuit board by utilizing through the hole technology, this circuit board being applied to a cylindrical-shaped insulating housing (e.g., 42 in Figure 3). This can be seen from column 5, line 18 to 20.
20 The insulating housing comprises an internal cavity 80 into which wires 24, 25, 26 are fed through holes 82 for connection to a power source. The insulating housing is nowhere described as a cooling member, and electrical insulators are usually poor thermal conductors.

Abtahi achieves cooling not by a cooling member connected to the secondary surface, but rather by the use of a fluid (Fig. 5, 110) applied on the principal side of Abtahi's circuit board with the LEDs. This fluid 110 may act as a cooling member and may be visually clear or colored to transmit the frequency of
5 light emitted by the LED packages as can be seen from column 7, line 60 to 65.

The leads of the LEDs 28 serve to provide an electrically conductive path from the upper side conductive layer 14 to the under side conductive layer, and thus does not disclose the electric isolation as required by amended claim 18.

In Roney, the heat transport through the circuit board towards thermally
10 conductive medium 14 in Figure 2 is effected by means of the anode and cathode of the LEDs mounted on the circuit board via through the hole technology (column 3 lines 42 to 44).

In summary, with claim 18 as amended, to focus of the invention pertains to the conduction of heat through the circuit board to a cooling member.
15 Hochstein utilizes conducting pads 50 connecting both sides of the circuit board for this purpose. Such a mechanism for thermal conduction from principal to secondary surface is not necessary according to the invention. Abtahi does not teach heat conduction from the primary to the secondary surface of the circuit board to a cooling member, nor would it need to, given its cooling scheme is
20 achieved by means of the fluid cooling member being arranged on the principle side of the circuit board. Roney transports heat from principal to secondary surface of the circuit board via the electrodes of the LEDs.

**35 U.S.C. §103 OBVIOUSNESS OF REMAINING CLAIMS OVER VARIOUS COMBINATIONS
OF HOCHSTEIN IN VIEW OF RONEY AND ABTAHI, ZOUZOULAS, PEDERSON, AND DEESE**

Applicants rely on the above arguments in asserting that the claims
depending from claim 18 are not obvious in view of any combination of prior art
5 cited above. The additional references are cited by the Examiner for limitations
addressed in the dependent claims—applicants respectfully contend that the
combination of the above references does not serve to obviate the elements of
claim 18.


Applicant would also like to note that Pederson (earliest date August 4,
10 1999) does not constitute prior art here, since the present application has a
priority date of May 12, 1999; priority has been perfected because the priority
document was forwarded to the U.S. Patent Office from the International Bureau,
as evidenced by the Notification of Missing Requirements mailed February 12,
2002.

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CONCLUSION

Inasmuch as each of the objections have been overcome by the amendments, and all of the Examiner's suggestions and requirements have been satisfied, it is respectfully requested that the present application be reconsidered, the rejections be withdrawn and that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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